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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Mounting Device

We, IMPERIAL CHEMICAL INDUSTRIES LIMITED of Imperial Chemical House, Millbank, London, S.W.1., a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a mounting device, and more particularly it concerns a device for mounting specimens on a microtome during the preparation of sections of tissue for microscopic examination.

In the preparation of sections of tissue for microscopic examination, it is usual to embed the sample of tissue in a block of paraffin wax, and then slice sections from one face of the block by means of a microtome. The block of wax is usually attached to a clamped member in the form of a support, for example a block of wood, which is clamped in a fixed chuck, and, by means of a controlled movement of the chuck, the block of wax is repeatedly pressed against the cutting edge of a fixed knife so that thin sections containing the tissue to be examined are cut from the block of wax. The thickness of the sections being determined by the extent of the lateral movement of the chuck relative to the fixed knife between the slicing of each section.

It often happens that some time after a series of sections has been cut from a particular block, it becomes necessary to cut further sections in order, for example, to examine the extent of a lesion through the sample of tissue. When this situation occurs, it is necessary for the block of wax containing the sample of tissue together with its support to be remounted in the chuck, and in order to obtain sections which are cut in the same orientation and form a continuous series with those previously cut, it is necessary to remount the support so that the face from which sections are to be cut is exactly parallel to the cutting edge of the fixed knife. This has previously been judged by eye

in the case of a support formed from a wooden block, or by registration of a flange against the outer face of the chuck. Neither of these methods entirely satisfactory when the sections to be cut must be very thin, for example 4 microns thick, and also of uniform thickness, because the jaws of the known chucks operate so that their force is exerted in a plane parallel to the face from which the sections are to be cut, and the support tends to move, and perhaps become skew when the jaws are tightened.

An object of the present invention is to provide a chuck in which the support may be remounted in the chuck so that the face from which the sections are to be cut is in the same plane as in any previous mounting, and which must necessarily be parallel to the cutting edge of the fixed knife.

It is clear that a mounting device which achieves this result may be applied to any mechanism for precision cutting, and accordingly, this invention is not limited to a chuck for use on a microtome.

The invention provides a mounting device for a cutting machine, which comprises a chuck and a clamped member capable of supporting the material to be cut, the chuck comprising a backing member providing a surface and a fixed jaw located relative to each other to receive the clamped member and prevent rotation of the clamped member about axes parallel to and perpendicular to the said surface, and a co-operating jaw movable about a pivot relative to the surface and the fixed jaw; the clamped member comprising a backing surface which is complementary with the surface of the backing member of the chuck and jaw-engagable portions which co-operate with the jaws of the chuck upon tightening thereof to hold the clamped member with its backing surface against the complementary surface of the backing member of the chuck and with one jaw-engagable portion against the fixed jaw of the chuck.

The jaws of the chuck and the jaw-engaga-

[Price 5s. 0d.]

ble portions on the clamped member may be surfaces or edges, however, if two edges are to be held in contact with each other upon tightening of the jaw, then such edges should be disposed at right angles to each other.

In a practical embodiment of the invention, the jaws of the chuck are surfaces, and the jaw-engagable portions of the clamped member are surfaces or edges.

All the surfaces are planar in the preferred embodiment of the invention but the precise shape is not important provided that reproducible contact with the engaging surface or edge is obtained.

The clamped member may be formed in the shape of a truncated prism where the base provides the backing surface, and the opposed sloping sides provide the jaw-engagable portions. The material to be cut is supported on the truncated surface. However, a preferred shape is a rectangular parallelepiped where the base provides a backing surface and the edges of the surface opposite to the base provide jaw-engagable portions. The material to be cut is supported on the said surface opposite to the base.

The invention also provides a microtome; that is a device for cutting thin sections of material from a block, which comprises an operating mechanism and a chuck whereby the block, secured to a member clamped in the chuck, may, by a controlled movement of the chuck, be repeatedly pressed against the cutting edge of a fixed knife to slice thin sections of material from a face of the block, the position of the block relative to the cutting edge of the fixed knife being adjustable between the slicing of each section to determine the thickness of the sections being sliced, together with a clamped member in which the chuck and clamped member constitute a mounting device as hereinbefore defined.

The invention further provides a microtome in which the chuck comprises a backing member providing a surface, a fixed jaw, and a co-operating jaw movable about a pivot relative to the surface and the fixed jaw, the surface and the fixed jaw being located relative to each other and to the movable jaw to receive and prevent from rotation about axes parallel to and perpendicular to the said surface, a member capable of supporting the material to be cut and having a backing surface for engagement with the surface of the backing member of the chuck and complementary therewith, and also having jaw-engagable portions which, upon positioning such a member in the chuck, co-operate with the jaws of the chuck upon tightening thereof to hold the member with its backing surface against the complementary surface of the backing member of the chuck and with one jaw-engagable portion against the fixed jaw of the chuck.

In order that the invention may be more fully understood, one preferred embodiment of

the chuck and two preferred embodiments of the clamped member will now be described, by way of example only, with reference to the accompanying drawings in which:—

Fig. I is a cross sectional elevation of the chuck along the line A-A of figure II, and including the clamped member,

Fig. II is a front elevation of the clamp only,

Fig. III is a cross sectional elevation of the chuck including an alternative (preferred) clamped member, and

Fig. IV is a diagrammatic representation of the chuck and clamped member when incorporated in a conventional rocking microtome.

The mounting device illustrated in Figs. I and II comprises a chuck body 1 in the form of a generally cubic metal block, provided with a hole 2 of circular cross-section and having a flat portion 3 to enable the body to be attached to a shaft 26 of a microtome (Fig. IV), or other suitable mechanism, without allowing the clamp to rotate on the shaft. The body 1 forms a backing member and is shaped to provide abutments in the form of a surface 4 and a fixed jaw member 5. A movable jaw member 6 is pivoted on a pivot pin 7 supported between two lugs 8 formed integrally with, or attached to, the clamp body 1. The movable jaw member 6 is caused to pivot on the pivot pin 7 by the action of a screw 9, which extends through a hole 10 in the jaw member 6 and into a threaded hole 11 in the clamp body 1 and operates against the action of a spring 12 fitted between a recess 13 in the movable jaw member 6 and a recess 14 in the clamp body 1.

A clamped member 15, illustrated in Fig. I, is made of relatively rigid material, for example wood or a hard plastics material, and is formed in the shape of a truncated prism, the base of which provides a backing surface 16 which is complementary with the surface 4 of the backing member of the chuck body 1. The jaw members 5 and 6 abut the sloping surfaces 17 and 18 of the truncated prism forming the clamped member 15, so that when the screw 9 is tightened, the backing surface 16 is pressed against its complementary surface 4 and the sloping surface 17 is pressed against the fixed jaw 5 by the action of the jaw member 6 on the sloping surface 18. The clamped member 15 is also provided with a surface 19 to which a block of wax 20 containing a sample of tissue may be affixed. The outer face 21 of the block of wax is the face from which sections are to be cut, and since this face 21 bears a fixed relationship to the backing surface 16 and the sloping surface 17 it will also bear a fixed relationship to the clamp body 1 when the complementary surface 4 and 16 are pressed together, and the sloping surface 17 is pressed against the fixed jaw 5. Accordingly the clamped body 15 may be removed from the clamp body and then replaced

or remounted so that the face 21 of the wax is in the same relationship to the clamp body 1 as it was before being removed from the clamp body.

5 Accordingly, provided that the position of the clamp body has not been altered between successive mountings of the clamped member 15 in the clamp body 1, then by means of the mounting device illustrated, the face 21 of the wax block 20 from which the sections are to be cut may be repositioned so that it is always in a plane parallel to that of any previous mounting.

10 An alternative form of clamped member 22 is illustrated in Fig. III. The clamped member is made of relatively rigid material, for example wood, hardboard or hard plastics material, and is formed in the shape of a rectangular parallelepiped, the base of which provides a backing surface 23, and the edges 24 and 25 of the top surface are jaw-engagable portions which abut the fixed jaw 5 and the movable jaw 6 respectively. Tightening of the screw 9 causes the backing surface 23 to be pressed against the complementary surface 4 and also 25 against the complementary surface 4 and also the edges 24 and 25 to be pressed against the fixed jaw 5 and against the movable jaw 6 respectively. The top surface of the clamped member can support a block of wax 20 containing tissue to be sectioned in the same way as described above.

15 In operation, when the mounting device is used in a microtome, the chuck body 1 is attached to the shaft 26 of the microtome (Fig. IV), which is enabled to rock about a knife edge 27 against the action of a spring 28. The clamped member 22, together with its block of wax 20 containing the sample of tissue to be cut, is placed in the chuck with the backing surface 23 against the complementary surface 4 of the chuck, and also with the edge 24 against the surface of the fixed jaw 5 so that abutment of these surfaces and edges prevents the clamped member 22 from rotation about 45 axes parallel to and perpendicular to the complementary surface 4. The shaft 26 is then rocked about the knife edge 27 by an operating mechanism (not shown) to cause the face 21 to be pressed against the cutting edge of a fixed knife 29 and a section to be cut from that face. The shaft 26 of the microtome is advanced between the severing of each section by a vertical movement of the rod 30, which causes the surface 31 upon which the knife edge 27 rests to pivot about a second knife edge 32. This vertical movement is achieved by the turning of a screw (not shown) coupled by a ratchet and pawl device to the operating mechanism (also not shown) for the shaft 26 so that the rod 30 is raised during the return stroke of the shaft 26, but kept stationary during the cutting stroke.

20 Although the above description of a microtome, and its use together with the mounting device of the invention, includes a clamped

member as illustrated in Fig. III, it will be evident that a microtome could easily be operated with a clamped member as illustrated in Fig. I, and the above description should be considered as including such a microtome.

70 The particular pivotal action illustrated for the movable jaw 6 could also be replaced by other pivotal means of moving the jaw 6, for example, it could be spring biased into the closed position and releasable by a lever action.

WHAT WE CLAIM IS:—

1. A mounting device for a cutting machine, which comprises a chuck and a clamped member capable of supporting the material to be cut, the chuck comprising a backing member providing a surface and a fixed jaw located relative to each other to receive the clamped member and prevent rotation of the clamped member about axes parallel to and perpendicular to the said surface, and a co-operating jaw movable about a pivot relative to the surface and the fixed jaw; the clamped member comprising a backing surface which is complementary with the surface of the backing member of the chuck and jaw-engagable portions which co-operate with the jaws of the chuck upon tightening thereof to hold the clamped member with its backing surface against the complementary surface of the backing member of the chuck and with one jaw-engagable portion against the fixed jaw of the chuck.

2. A mounting device as claimed in claim 1 wherein the jaws of the chuck are surfaces.

3. A mounting device as claimed in claim 1 wherein each of the jaw-engagable portions is a surface of an edge.

4. A mounting device as claimed in claim 2 or 3 wherein each surface is planar.

5. A mounting device as claimed in any preceding claim wherein the movable jaw is spring biased into the closed position and releasable by a lever action.

6. A mounting device as claimed in any preceding claim in which the clamped member is formed in the shape of a truncated prism or a rectangular parallelepiped.

7. A microtome as hereinbefore defined together with a clamped member in which the said clamped member and the chuck of the microtome constitute a mounting device as claimed in any preceding claim.

8. A microtome as hereinbefore defined in which the chuck comprises a backing member providing a surface, a fixed jaw, and a co-operating jaw movable about a pivot relative to the surface and the fixed jaw, the surface and the fixed jaw being located relative to each other and to the movable jaw to receive and prevent from rotation about axes parallel to and perpendicular to the said surface, a member capable of supporting the material to be cut and having a backing surface for engagement with the surface of the backing member of the chuck and complementary 130

- 4 therewith, and also having jaw-engagable portions which, upon positioning such a member in the chuck, co-operate with the jaws of the chuck upon tightening thereof to hold the member with its backing surface against the complementary surface of the backing member of the chuck and with one jaw-engagable portion against the fixed jaw of the chuck.
- 5 9. A mounting device substantially as hereinbefore described with reference to and as illustrated in Fig. I or Fig. III of the accompanying drawings. 10
10. A microtome and clamped member substantially as hereinbefore described and as illustrated in FIG. IV of the accompanying drawings. 15

W. SCOTT.

Agents for the Applicants.

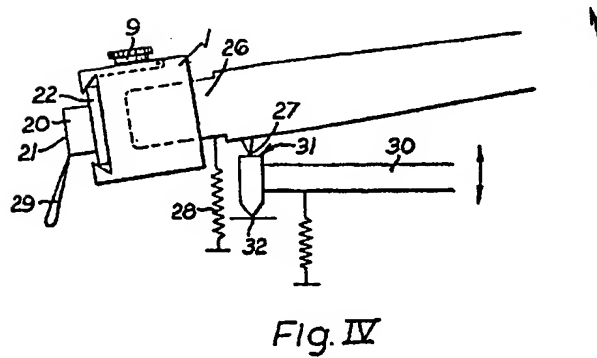
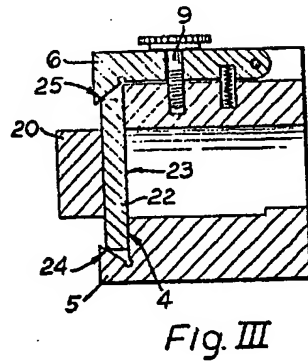
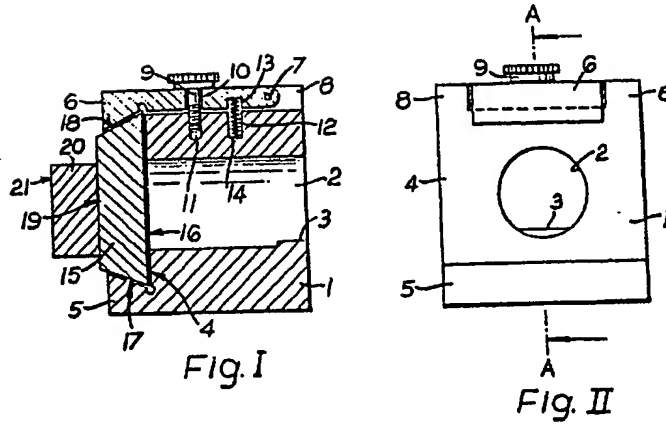
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COMPLETE SPECIFICATION

1 SHEET

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